THURSDAY, JANUARY 31, 1895.

GEO-MORPHOLOGY.

Lithogenesis der Gegenwart. Beobachtungen über die Bildung der Gesteine an der heutigen Erdoberfläche. Dritter Theil einer Einleitung in die Geologie als historische Wissenschaft. By Johannes Walther. 8vo. pp. viii. + 535-1055. (Jena: G. Fischer, 1894.)

Geotektonische Probleme. By A. Rothpletz. 8vo. pp. 175. 107 figures, and 10 plates of sections. (Stuttgart: E. Schweizerbart, 1894.)

Morphologie der Erdoberfläche. By Dr. Albert Penck. Ratzel's "Bibliothek Geographischer Handbücher." 8vo. 2 vols. Vol. I. pp. xiv. + 171. 29 figures. Vol. II. pp. x. + 696. 38 figures. (Stuttgart: J. Engelmann, 1894.)

RECENT discussions in England as to the relations between geology and geography have only served to show that these sciences are so intimately associated that no satisfactory line of demarcation can be drawn between the two. These three works illustrate the extent to which this view has been accepted in the schools of Germany and Austria, and the valuable results to both sciences that follow from a due recognition of the fact. The three works agree in this, though they are very different in their aims and subject-matter. The first is a manual on rock-formation; the second, a monograph on one type of earth-movements; and the third, a systematic text-book of structural geography. One is a restatement of the principles of correlation, another a protest against speculation, and the other a compilation of the classifications of, and theories respecting, the different geographical forms. They have, however, so much in common in their methods, that they may be conveniently noticed together.

Prof. Walther's work goes even further. It shows not only the inseparability of geology and geography, but the need of a knowledge of biology for the correct application of the evidence of palæontology to stratigraphy. Since the days of William Smith, the evidence of fossils has been regarded as final in both historical and stratigraphical geology. It is therefore rather startling to find a geologist stating that the history of the earth could have been written from the structure of the rocks alone, without the assistance of the organic remains within them. It has been the rule, in the determination of the age of any particular bed, to accept only the evidence of the fossils as valid. So long as the method of correlation by the proportions of species and genera common to two horizons, was confined to comparatively simple areas, it gave fairly trustworthy results. But when extended beyond Britain and the North European plain, it was the cause of serious confusion. The classification of the very variable Cainozoic deposits of the Mediterranean basin were involved by it in chaos; it caused beds in Australia to be assigned to the highest instead of the lowest division of the Cainozoic, and led to limestones in the West Indies, probably formed in part within the historic period, being referred by high authorities to the Miocene. Even in such a simple sequence as that of England, the method led to errors, as, *e.g.*, in the exaggeration of the gaps in the geological record, such as that between the Chalk and the Lower London Tertiaries. Occasionally a warning against the neglect of lithology would be uttered, as by Godwin Austen and Sorby, or an effort made to use it. But the former were ignored; and the latter were not at first judicious, as in the case of the famous generalisation, that we are still living in the age of the Chalk, a suggestion about as useful as that we are still living in the Silurian, because sandbanks were formed then and are forming now.

For the recognition of the necessity for the limitation of palæontology, we have in the main to thank biology. Taxonomy—the study of distribution—has shown that age is only one of many conditions that govern the character of a fauna; the depth, the composition of the sea-floor, the distribution of the ocean currents, the proximity of different bathymetrical zones, all exercise an influence. Thus a fauna is often more allied to an extinct one, than to those which are living simultaneously in adjoining areas. Taxonomy has exercised its influence in two ways. In the first place, it has insisted on the proper recognition of the self-evident fact that deposits change in space as well as time; that a sandstone, *e.g.*, may change into a clay laterally as well as vertically. Thus it is now recognised that the dividing line between the Gault and the Upper Greensand is a varying lithological one, and that the latter formation in one area was formed at the same time as Gault was being laid down in another. In the second place, it has led to the adoption of more detailed, zonal stratigraphy, and the demonstration thereby, that adjacent beds of different composition, and containing different faunas, have often been deposited simultaneously in stratigraphical continuity.

These views have gradually worked their way into general recognition by geologists, but Walther's is probably the first text-book in which they have been adequately expressed. The inconvenience in map-making, and still more in map-reading, which they involve, has led, perhaps, to an unconscious bias against them. Hence, even when theoretically admitted, their guidance has not been accepted practically. Walther's "Geologie als historische Wissenschaft" is, however, saturated with the results of biological teaching, the influence of which we may trace in nearly every page of the "Lithogenesis." Though well skilled in palæontology, he does not attach an exaggerated importance to the evidence of this science, but seems even to tend to the other extreme: if he does not underrate its value, he at least protests that it is less indispensable than has been thought. In his ardour for lithology, he goes so far as to say (p. 538) that "if we had an exact phenomenology of rocks, we could, without fossils, from the rocks alone, read the history of the earth." Walther's work is an effort toward such a "phenomenology," by an exposition of the lines along which it may be attained. He defines (p. 537) the objects of lithogeny "as the elucidation of the development of the fossil rocks by the investigation of rock-forming processes now in operation." He urges that rocks should be studied from the same point of view as animals and plants. He thinks that in comparative lithology, ontogeny should hold the same place as it does in comparative morphology. This lithology he divides into three sections, equivalent to those adopted in biology. Thus, he says that the study of rock structure answers to comparative anatomy, the development of rocks now in process of formation to embryology, and petrography and stratigraphy to palæontology. Throughout the book he introduces biological terms and phylogenetic trees to emphasise his views. For example, he classifies rocks as homologous and analogous; as the former, he includes all those which are formed in the same "Facies-bezirke," and as the latter, those which are formed under different geographical climates. And climate, in the sense of this later-day lithology, is "the sum of all the meteorological and oceanographic conditions, including organic and inorganic processes," which affect the formation of a rock. The use, however, of these terms often appears of doubtful value; thus, when he states that the lavas of an oceanic island are only homologous with those of a continent, we doubt whether we are in any way better for the information.

The work is divided into three parts, entitled, respectively, "General Lithogeny," "the existing Facies-bezirke," and "the bases of Comparative Lithology." The first of these occupies fourteen chapters: it begins with an account of the destruction, deposition, and alteration of rocks. The destructive processes he divides into four classes: weathering, chemical, physical, and organic; ablation, both of ice and rock surfaces; transport; and corrasion. The last he restricts to the comparatively insignificant polishing action of loose material carried about by the wind, rivers, ice, or sea. According to Walther's scheme, denudation results from ablation, transport, and corrasion; he attributes it to four agencies, viz. the wind acting by "deflation," running water by "erosion," glacier ice by "exaration," and the sea by "abrasion." The second part of the book is the longest; each chapter is devoted to the description of a group of deposits, which he says are "homologous," as they are formed in the same "facies-bezirke" or geographical zone. Thus, on the continents there is the zone of the Polar Regions, with moraines, humus, ochre, &c.; the temperate zone, with its black earth, loess, &c.; the desert girdle, with its sand and salt deserts, and dried-up lake-basins; and the tropical zone, with its laterite and cotton soil, &c. Other groups of homologous rocks are the products of continental volcanoes, shore deposits and those of open seas, of oceanic abysses; coral reefs, and volcanic islands. Very obvious objections to this classification could be easily raised, and it certainly could not be recommended for the purposes of ordinary teaching; but as long as it is used only to illustrate the association of deposits, formed under any particular set of geographical conditions, it is extremely useful. The different subjects treated in the work are, moreover, brought well up to date. Thus, *e.g.*, in the account of the supposed iron-secreting organism *Gaillonella*, the latest botanical researches of Molisch are summarised, and its character left more doubtful than ever. The chapter on coral-reefs is especially well done. The sketch of the life of a reef (pp. 915-927), which he calls the "richest of bionomic assemblages," is the best we know. The definition (p. 909) of a coral reef as being essentially formed of branching corals, with calcareous sediment filling the interspaces, expresses a truth which is often overlooked. Even this is enlarged on another page, where it is stated that geologically a reef must be regarded as including not only the calcareous sediment on the surface, but that which is formed around it, to the depth of as much as 3000 metres. He illustrates the slopes around coral islands by the numerical method, due to Dietrich, which brings out clearly the differences between such atolls as those of the Bahamas and Keeling Island. The mean figures which he gives do not, however, teach much. It is interesting, therefore, considering that the coral island question is handled with full knowledge of all the latest information, and that the author's own investigations took place upon a region to which Darwin's theory was never intended to apply, to notice that he accepts that theory as substantially correct. It is surprising, considering the accuracy of the rest of the chapter, that a recent photograph of a *Pectinia quadrata* is again quoted (p. 899) as a *Manicina areolata.*

The third section of the work is that which enunciates the general conclusions. It contains short chapters on the correlation of facies, the equivalence of rocks, the changes in the facies of deposits, and the lithological significance of organisms. This part of the book is, however, the least satisfactory; perhaps because most useful originality had been expected in it. Variations from the ordinary method of treatment and overstrained analogies had been passed in the hope that they would be turned to some account. This part of the book is, however, so general in its treatment, that the conclusions are rather indefinite. Nevertheless, the work is throughout so novel in treatment, so up to date in its information, that this cannot seriously impair its value.

Rothpletz's "Geotektonische Probleme" is a very different work from either of the others. Its title is a little misleading; one might expect from it an account of earth-movements in general, and a discussion of the theories of earth-structure by which these may be explained. One is, therefore, a little startled at finding that it commences with a protest against theories, and a warning against the danger of ideas creeping into general acceptance, under cover of a convenient term. He points out, for example, that Suess's term of "horst" for a mountain mass formed of one block of material, is so useful in descriptive geology, that it has been widely adopted. Rothpletz fears, therefore, that Suess's theory of the origin of "horsts," and its corollary that horizontal beds are never uplifted, may be unconsciously accepted. Similarly he foresees that, by the adoption of other convenient terms, the whole heresy of "Suessism" may gradually work its way into a position of influence it would never attain by its merits. The perils to geological progress threatened by this insidious "hypothesis building phantasy," as Rothpletz calls it, he thinks can only be averted by the critic, whose duty it is to bring all hypotheses to the test of facts. And the author sets himself to perform this task. His volume is devoted to the class of earth-movements known as "overthrusts." When cases of the inversion and repetition of strata were first noticed, they were regarded as due to the folding of the beds. During recent years, many of these have been shown to be due to the thrusting of one set of beds on to another, either horizontally or at a low angle. Rothpletz shows that these overthrusts are even wider in their distribution than is now generally admitted. He describes the most important cases, summarises the literature and various theories regarding them, and states the explanation which seems to him to agree best with the facts. Most of the examples quoted, the author has personally examined.

The first case taken is that of the classical Linth in the Glarus. This, as interpreted by Escher and Heim, has exercised a great influence on geological thought. The valley has previously been regarded as due to a great double fold. Rothpletz, however, maintains that it is a "graben" or rift-valley, formed by the subsidence of the block of material which once filled it up. One difficulty that hitherto told against this explanation, was the fact that the marginal faults had never been discovered. Rothpletz, however, maintains that they are there; he describes them at one point, in a section which, he declares (p. 10), "must silence the most utterly sceptical." The denial of Heim's famous double fold necessitates a new interpretation of other features in the geology of the country. Thus the rocks in the Schild—the mountain to the west of the town of Glarus—have been explained by Heim as the crushed-out beds of the middle limb of the fold. Rothpletz, however, maintains—and his evidence seems conclusive—that they are due to an overthrust. He adds a further difficulty to Heim's theory, by showing that if true it is inadequate as it stands. The country is more complex than a double fold can explain; a treble and a quadruple fold at least must be assumed, for the beds repeat themselves more than thrice. This Rothpletz explains by the assumption of three overthrusts, which he names after Schild, Kapf, and Plattenalp.

The next case considered is that of the mountain mass of Sentis, to the north of the Glarus area. This was described by Escher von der Linth in 1857. It was then said to be remarkable in having a great series of faults crossing the axes of the folds, but none parallel to them. This was confirmed by the maps and memoirs of Escher's pupils, and Suess, therefore, in 1885, made the Sentis the type of a class of mountain structure named "Blätter." Some discrepancies between the descriptions and the maps led Rothpletz to re-examine the country. The result is that he finds numerous faults parallel to the ridges, as well as across them, and also a series of overthrusts which occurred later than the folding, and earlier than the transverse faults.

From the Sentis it is natural to turn to the Juras. This range has long been famous owing to the ingenious devices designed to enable the fold theory to account for the rock sequences that occur there. But the "vanishing trick" diagrams, by which the absence of certain beds has been explained, have always been viewed with suspicion; they seemed too much like the schemes by which Ptolemaic astronomy was reconciled with facts. Müller in 1860 demonstrated their insufficiency, but they still survive. Rothpletz discusses this fold theory in its three most plausible modifications, viz. the faulting of over-folds; the folding of an area after the rocks in the centre have been raised by a double fault; lateral contraction forcing one side of a valley of erosion over on to the other. Rothpletz dismisses these, and accepts the theory of overthrusts along slightly inclined thrust-planes.

The fifth case is that of the highlands of the north-west of Scotland. This is so well known, that the author adds nothing new, except a doubt as to the relation of the minor and major thrusts. He notes with relish the abandonment of the view at first announced that the thrust-planes started as a result of the inversion of over-folds.

A simple example of overthrusting in a much later geological period is afforded by the granite of Lausitz in Saxony, which occurs above the Turonian limestones. This superposition was explained at first by the chalk having been deposited under an overhanging cliff, and then by the granite having been dropped as an erratic. Both these theories were ridiculously inadequate. The most popular explanation assigned an eruptive origin to the granite; the absence of contact-alterations and of apophyses from the granite is fatal to this. Overthrusting is the only theory left, and this Rothpletz accepts as satisfactory. The earth-movements in the coal-fields of Westphalia, Belgium, and northern France are next considered; these have long been known to be extremely complex. The explanation now accepted, is summarised with great lucidity, and illustrated by over thirty figures and three plates of sections. It attributes the present structure of the country to the inthrusts of slices of complex composition between other deposits. The last case considered is that of the area of the coast of Provence and the French Alps. The author has not personally examined the ground, and so would have preferred not to discuss it. Haug, however, has suggested that the assumed "pli-failles" (or fold-faults) are often only inverse faults, and that the latter are capable of explaining the phenomena without the hypothetical folds. Rothpletz, therefore, thinks it advisable to discontinue the use of the word "pli-faille," and suggests the substitution of "faille de recouvrement," or some other term which does not beg the question.

In the concluding chapter, Rothpletz summarises the general characters of overthrusts. He remarks that their importance is being more widely recognised, and that they are accepted now in explanation of many phenomena for which the agency of folding was formerly invoked. He thinks that they probably always occur in mountain formation. He discusses their relations to the earth-movements with which they are associated, as far as our present knowledge enables these to be generalised. Thus, the thrust-planes occur approximately parallel to the folds, but the inclination of the planes is usually in the opposite direction to that of the mountains: this might have been expected, as it is in harmony with some of Daubree's experiments. Divergences between the strike of folds and overthrusts, however, occur, and are explicable by the later origin of the latter. The inclination of thrust-planes is almost always different from that of the beds or folds; the former, however, both above and below the thrust-plane, occur in their normal sequence. Friction breccias, mylonites, &c., occur along the thrust-plane, while "schleppung," or terminal curvature of the beds toward the plane, is generally developed. A single thrust-plane may occur; but, as a rule, there are many parallel to one another, and this results in the type named by Suess the " Schuppen-structure." The chapter concludes by a consideration of the classification of earth-movements, and its difficulties; that advanced by Suess, he recognises as the most important, but he does not admit it as at all satisfactory.

This shyness of classifications is in striking contrast to the attitude of the last work, in which all the types of " earth-forms " are classified in a detail, and with a terminology, which seems at first needlessly elaborate. The work is a systematic account of the orography or structural geography of the earth, and is quite unlike any existing text-book. It has taken more than ten years to prepare. The delay has been partly due to the enormous amount of literature that has had to be considered, but also to the fact that during this period two works have appeared which have completely changed the whole aspect of geographical science. These are Richthofen's "Führer fur Förschungsreisende," and Suess' " Antlitz der Erde." The former introduced a more scientific classification of "earth-forms" or geographic types, while the latter has revolutionised our ideas as to how those earth-forms have been developed. One of the great advantages of Prof. Penck's work is that it is a re-description of the earth's surface in the terminology and in accordance with the views of these two leaders of geographical thought. It is a book which it is impossible to summarise. It is a compilation showing on every page the most detailed care and accuracy. No one acquainted with Prof. Penck's previous writings will be surprised at his extensive knowledge of the literature of both geography and physical geology. The numerous historical summaries that occur in it, show how thoroughly the author has ransacked literature, and how well the book has been brought up to date. Works published so late in 1894 as that containing Heim's description of the Pleistocene earth-movements in the Alps (" Die Enstehung der Alpinen Randseen "), and Günther's memoir on the influence of atmospheric pressure on isostacy, are included. It is only natural that English literature is not so thoroughly done as the German, but important omissions are surprisingly few. The two most important are probably the absence of reference to Whymper's work on aneroids, from the chapter on altitude determinations, and to C. Reid's explanation of the formation of the chalk coombes, from the discussion of the origin of dry valleys.

The work is divided into three parts, dealing respectively with general morphology, the surface of the earth, and the sea. Its plan is based on the conception of the earth's surface as composed of a series of " earth-forms " which range between the extremes of mountains and valleys. The description and classification of these, and the study of their origin and development, form the subject-matter of geographical morphology. This science, therefore, depends on the literature of geodesy, geology, and geography. The book commences with an outline of general morphology, which depends in the main on the first of these. The chapters on mathematical geography, and on morphography and morphometry, are probably the most valuable of the five devoted to this part of the subject. In these he states the latest conclusions upon various debated problems. He points out (p. 9) that the amount to which the form of the earth deviates from an ellipsoid of revolution is between ± 200 and ± 250 m. He discusses the relative value of the various geoids, and expresses a preference for Northern Europe, for Bessel's instead of Clarke's, which is used in England. The principles of earth-measurement are briefly considered; the standard levels used in different countries are tabulated, and their relations to each other shown. The value and method of construction of hysographic, klinographic, hypsoklinographic, and bathygraphic curves are shown. The difficulties in the determination of altitudes caused by the uncertainties of refraction are pointed out. The inevitable inaccuracy of map lines is illustrated by a list of the lengths assigned to a portion of the Istrian coast in a series of standard maps; the figures range from 105 km. to 223·81 km. The calculation of the volumes of continents is considered, and finally elaborate tables given of geographical statistics. The ratio of land to water is taken as 2·54 (p. 97); the principal previous estimates are given from the time of Riccioli, who in 1661 estimated that the land was in excess in the proportion of 8 to 5. An interesting sketch of the literature on "geographical homologies" shows how early attention was drawn to the remarkable parallels and contrasts in the distribution of land and water. This part of the work concludes with the consideration of the question of the permanence of oceans and continents. Penck quotes Cayeux as if this author's investigations proved the terrigenous origin of all the chalk, and though he notices Blanford's arguments, he does not seem to appreciate their full significance. His sketch of the literature of the subject shows that, though with some striking exceptions, the difference on this question has been one between geologists on one side, and geographers on the other. In this connection it is interesting to note that Penck accepts (p. 167) the view that the ocean floors have a higher specific gravity than the continents, and places the difference, according to Helmert's work, at ·001 of the specific gravity.

The second part of the book describes the surface of the earth, or the " Landoberflache." The first section of this deals with the composition of the earth's crust, and the forces that act upon it. The figures given to illustrate Suess' terms are very clear and instructive; the table of geological systems is, however, out of date; the Ordovician is not accepted, and the Tertiary and Quaternary are each regarded as equal to such divisions as the Trias and Permian. The account of the agents of denudation is very detailed and thorough. The hydraulics of river action (pp. 259-385) is treated with especial care, and the references to the literature of the subject include a much wider range than is usual. The controversy as to Baer's law of the influence of the earth's rotation on the direction of rivers is clearly summarised, and the truth of the law upheld; great stress is laid upon the deepening of the Rhine on its left bank in the regulated portions of its course. The author attributes to glaciers considerable erosive power; he maintains that the characteristic feature in erosion by ice, is that the excavations vary in depth with the strength of the rocks, so that true rock basins are formed (p. 409). He still accepts the glacial origin of cirques, and even approves of Ramsey's views of the origin of some of the Alpine lakes. The description of the existing "earth-forms," or geographic types, occupies the first 460 pages of the second volume. These "earth-forms" are divided into eight types—plains, heaped-up mounds, such as moraines and dunes, valleys and the highlands through which they run, basins, mountains, areas of subsidence, and finally fissures and caves. The characters, classification, method of formation and terminology, including both local and scientific names, are stated in detail. A sketch of the literature of each type is also given. The chapters on "Wannen" or basins, and on mountains, are probably the best. The book closes with an account of the oceans, and the deposits on their floors.

The one serious drawback to this book is its complete neglect of the evidence of zoological distribution. Thus, for example, the questions of the origin of the Caspian Sea and the lakes of Nicaragua, are fully considered, but no reference is made to their faunas. No theory, however, could be accepted which failed to account for the anomalous characters of these. But it would be too much to expect Prof. Penck to show the same mastery of the literature of biology as he does of geography and geology. In this respect, Walther's book is superior to that of Penck. But it is idle to estimate their respective merits, for the three works are so different. One cannot compare Walther's statements of the principles of correlation with Rothpletz's detailed mapping, and either with Penck's digest of literature. Penck's, however, will probably prove the most generally useful of the three. An English translation would be of great service, by calling attention to a branch of geography that has been unaccountably neglected in this country. Thus, in the Geographical Society's "Hints to Travellers," instead of the details of Richthofen's "Führer," the subject is not even mentioned. A translation would, moreover, necessitate greater precision in the definition of geographical terms, and the introduction of many new ones, for which there are now no equivalents in English, and which are essential to the scientific treatment of geography.

J. W. Gregory.

ORGANIC CHEMISTRY.

The Rise and Development of Organic Chemistry. By Carl Schorlemmer, LL.D., F.R.S. Revised edition, edited by Arthur Smithells, B.Sc., Professor of Chemistry in the Yorkshire College, Leeds. (London: Macmillan and Co., 1894)

FOR some time this excellent historical survey of the development of organic chemistry has been out of print, and students of chemistry will heartily welcome the appearance of a second edition, which has been extended, in order to include a review of the more important results of the original investigation of the last ten to fifteen years.

Facing the title-page is an exceedingly good likeness of Schorlemmer, admirably reproduced from a photograph; then follows a short biographical notice, giving a brief sketch of the author's career, in which his brilliant researches are described. This is a very welcome addition to the book, because, as the editor points out, Schorlemmer, with characteristic modesty, mentions these researches only on two occasions in the book (pp. 141 and 197), and then but very briefly.

Chapters i. to v. are very much the same as in the first edition, only a few slight alterations having been made. Chapter vi. deals with the perfection of the methods of organic analysis by Liebig, and these important researches, which affected in such a marked manner the subsequent development of organic chemistry, are perhaps scarcely discussed at sufficient length; a more detailed account of the history of organic analysis is to be found in Roscoe and Schorlemmer's "Treatise of Chemistry" (vol. iii. p. 40). This chapter vi. also contains a short sketch of the work which led to the discovery by Raoult of his well-known method of determining the molecular weight known as the cryoscopic method.

Chapters vii. and viii. have not been much altered, but chapter ix., which deals with the constitution of benzene, tautomerism, and the asymmetric carbon atom, has, as was to be expected, been largely added to, and made to embrace most of the important results of recent work.

The constitution of benzene is dealt with in a very interesting manner. Baeyer's researches, on succinosuccinic ester, which led to the rejection of Ladenburg's prism formula, are discussed, as well as those of Bamberger, on the reduction of naphthalene derivatives, the results of which may be said to have completely confirmed Baeyer's views.

After a short description of Laar's tautomeric hypothesis, the remainder of the chapter is taken up with Le Bel and van't Hoff's theory of the asymmetric carbon atom, and with Wislicenus' development of this theory. In a future edition, more emphasis might, perhaps, with advantage be laid on the general applicability of these theories, so that the student may not receive the impression that they have only been found valuable in the explanation of isolated cases, as, for example, the isomerism of the malic and tartaric acids, and of fumaric and maleïc acids.

The first part of chapter x. is devoted, principally, to the history of organic synthesis, and contains an account of Frankland and Duppa's work on aceto-acetic ester, and of Conrad's researches on malonic ester, showing the value of these ethereal salts in synthetical work. The synthesis of malic, tartaric, and citric acid is also mentioned.

A very valuable historical sketch of the chemistry of the sugars, including a clear exposition of the more important results of E. Fischer's classical researches, followed by an account of Ladenburg's synthesis of coniine, and of the synthesis of uric acid, by Horbaczewski, concludes this excellent chapter.

The remainder of the book does not differ materially from the first edition, except that a very good index of authors' names and subjects has been added.

Students of organic chemistry must always be interested in the development of the science, and to them this work will be cordially welcome. It is a thoroughly readable book, written throughout in an attractive manner, and comprising in one small volume all the facts necessary for understanding the growth of organic chemistry.

Schorlemmer wrote, whenever possible, in German,